Indicators of forest-dependent community sustainability: The evolution of research

by Thomas Beckley[1], John Parkins[2] and Richard Stedman[3]

This paper describes the evolution of research on socio-economic indicators of community sustainability in several Canadian Model Forest locations since 1994. In the Foothills and Western Newfoundland Model Forests, we employed an "expert-driven" approach to indicator selection and reporting. We used census data to document change over time on key community profile variables such as age, employment, income, population mobility, education attainment, poverty, and real estate values. Objective measures of these variables were supplemented with personal interviews in order to construct a more dynamic picture of community well-being. The early work of our group focused primarily on "profile" indicators—essentially static, descriptive indicators that allow one to create a snapshot of a community in time. Work is currently underway on the next generation of socio-economic indicators we describe as "process" indicators. Process indicators deal more with causal affects than outcomes. They include things like sense of place or attachment to place (which has implications for population mobility and education attainment). Process indicators also include variables such as leadership, volunteerism, entrepreneurship, and social cohesion—all of which we are attempting to include in a combined measure of community capacity.

Keywords: social indicators, community sustainability, model forest, forest-dependent communities, SIMFOR

Cet article décrit l'évolution de la recherche sur les indicateurs socio-économiques de la durabilité des communautés pour certains endroits situés dans les forêts modèles canadiennes depuis 1994. Dans le cas des forêts modèles des Foothills et de l'ouest de Terre-Neuve, nous avons utilise une approche « d'experts » dans le cas de la sélection et de la description des indicateurs. Nous avons utilisé les données des recensements pour documenter les changements au cours du temps pour les variables déterminantes du profil de la communauté tel l'âge, l'occupation, le revenu, la mobilité de la population, le niveau de scolarité, la pauvreté et la valeur immobilière. Les mesures objectives de ces variables ont été complétées par des entrevues individuelles de façon à élaborer un portrait plus dynamique de l'état de la communauté. Les travaux préliminaires de notre groupe se sont concentrés principalement sur les indicateurs du « profil », des indicateurs essentiellement statiques et descriptifs qui permettent d'établir un portrait instantané d'une communauté à un moment donné. Les travaux se poursuivent actuellement sur la prochaine génération d'indicateurs socio-économiques que nous décrivons comme des indicateurs du « processus ». Ces indicateurs traitent plus des causes que des conséquences. Ils comprennent des éléments comme le sens d'origine ou d'attachement à un endroit (ce qui a des impacts sur la mobilité de la population et le niveau de scolarisation). Les indicateurs du processus comprennent également des variables comme le leadership, le bénévolat, l'entrepreneurship et la cohésion sociale, que nous tentons d'inclure en totalité dans une mesure combinée de la capacité d'une communauté.

Mots-clés: indicateurs sociaux, durabilité des communautés, forêt modèle, communautés dépendantes des forêts, SIMFOR

Introduction

Thomas Beckley

John Parkins

Richard Stedman

For decades before the language of sustainability was widely adopted, people in the forestry and forest policy arena were concerned with social dimensions and consequences of their policies and practices. Harold and Lois Kaufman articulated a clear and concise definition of community stability more than a half-century ago (Kaufman and Kaufman 1946). Many of the elements of stability outlined by the Kaufmans' remain important to our understanding of community sustainability today. The Kaufmans' vision was slightly more static than the way we envision sustainability today (Beckley 1995). However, a critical underlying principle of both views is that we are interested in sustaining forests, in part, because forests in turn sustain human communities.

In the United States, the Sustained-Yield Management Act of 1944 codified this principle and articulated the reasoning behind it—to sustain human forest-dependent communities. The Act stated that timber harvests from federal land should be regulated and managed so as to provide employment stability in the timber-dependent communities (Nadeau *et al.*1999). In Canada, the relatively smaller human population and larger resource

[1]Faculty of Forestry and Environmental Management, University of New Brunswick
[2]Canadian Forest Service
[3]The Pennsylvania State University

104-07236/

base meant that concerns over resource depletion and community stability were later in coming, but such concern did eventually arise (Lucas 1971, Himelfarb 1982, Marchak 1983).

It is generally understood that one must be able to measure a phenomenon in order to manage it. That is, one must be able to identify a benchmark and then manipulate the system in an attempt to create movement or change in a positive direction. In the case of community stability and timber supply, the relationships were fairly simple, and yet due to faulty assumptions, the policy failed. The thinking was that community stability was largely a function of employment. So, employment was the measure or indicator of community stability. Employment was thought to be a function of timber supply. Therefore, the policy objective was to maintain an even flow of timber from public land to support stable employment, which in turn would translate into community stability. This simple model failed because it did not consider the widespread substitution of capital (machine power) for labour (manpower) as the timber industry matured. This substitution meant that the number of jobs decreased even as wood flow from public land increased.

For our purposes, the facts of this scenario are less important than the principles. The stability or sustainability of human communities is considered socially desirable. There are many costs to individuals and to society associated with continual construction and decommissioning of the physical infrastructure of human forest communities. There are also individual and societal costs associated with wildly fluctuating local populations in specific communities. Population instability may lead to unstable tax bases, over-capacity or under-capacity in infrastructure, as well as social pathologies such as higher rates of crime, divorce, suicide, and lower social cohesion. Therefore, where communities rely on forest land for their economic base, community sustainability is a desired outcome for forest policy and management. This is particularly true in areas where the forest is publicly owned. In such areas, at any rate, there is greater potential to manage the resource base in a way that will produce desired social outcomes.

The challenge, of course, is to identify meaningful and useful indicators for the purpose of tracking community sustainability. This paper describes nearly a decade of research related to research on sustainability of forest communities in Canada. There has been a logical progression of this work. We began with rather simple attempts to mimic the rather static set of indicators commonly used to profile communities and track changes over time. Using the model forests as laboratories, we added some significant refinements to this modest beginning. Today, we continue research on social indicators for forest communities along several dimensions. We will describe these later in the paper. First, we will discuss where the push for social indicators research came from, and the progression of the research over the past decade.

Measuring Sustainability

As the lexicon of sustainability gained popularity in the late 1980s and early 1990s, members of the forest policy community realized that they needed to take seriously the mandate to consider social and economic aspects of sustainable management. High on the list of priorities on the social side of the ledger was the sustainability of forest communities. The Canadian Forest Service began to build capacity for its ability to do this. In 1993, they hired a sociologist, and in the subsequent five years, they had as many as four sociologists on staff on a permanent or temporary basis.

There was a flurry of activity during this time. The model forests had recently been commissioned, but few on their staff possessed the tools or capability to fulfil the social science part of their mandate. Research in the model forests initially focused on their core competencies of ecology, management, inventory, and the like. The Socio-economic Research Network (SERN) of the Canadian Forest Service began working with individual model forests on indicator projects. Shortly thereafter, the group began collaborating with the Model Forest Network to make some of this information more widely available.

At around the same time (mid 1990s) the Canadian Council of Forest Ministers, with the help of the Canadian Forest Service, was busy compiling a list of Criteria and Indicators of Sustainable Forest Management (CCFM 1997). One element of that effort involved defining indicators of sustainable forest communities (Fig. 1).

These measures documented the number of forest-dependent communities, the degree of forest dependence, and the diversity of forest use in communities across the nation. A weakness in the reporting of these indicators was the fact that the desired direction of trends for these indicators was never defined. So, forest managers and policy makers were never given a directive to try to reduce the number of communities in the heavily dependent category (over 50% of economic base in the forest sector), or to increase the number in the moderate category forest (between 10% and 50% of economic base in the forest sector). The process for selection of these indicators was somewhat *ad hoc*. Invited science experts and provincial representatives came up with the initial list, but few of these individuals were social scientists. As well, there were several levels of oversight and the final list was pared down substantially from the science panel's suggestions. Partly in response to this process, Beckley and Burkosky (1999) performed a literature review on commonly used indicators for community sustainability, and this work informed some of the indicator work that followed in the model forests.

As a result, the indicator research in the specific model forests took a more grounded approach and was focused more on variables or indicators that were economic or sociological rather than related to forest dependence or use. We collected qualitative, secondary data on social indicators to establish baseline information on model forest communities.

> Social indicators in the context of the Foothills Model Forest can be defined as an integrated set of measures related to the social and economic well-being of human populations living within a forest ecosystem. Social indicators are statistics that can be collected over time and used for policy and management (Force and Machlis, 1997). The general goal is to establish baseline data that can be incorporated into decision support systems and to use the data as a basis for future comparison across time and between regions (Parkins and Beckley 2001).

In addition to assembling secondary data on income, poverty, employment, human capital, real estate values, and population mobility, Parkins and Beckley (2001) interviewed 145 local people in the Foothills Model Forest about these themes. The respondents' subjective perspectives on these trends

CCFM Criteria and Indicators

Element 6.3. Sustainability of Forest Communities

6.3.1. Number of communities with a significant forestry component in the economic base

6.3.2. Diversity of the local industrial base

6.3.3. Diversity of forest use at the local level

Fig. 1. CCFM indicators of sustainable forest communities.

helped to triangulate their data, but they also confirmed their suspicion that quantitative indicators, taken alone, do not tell much of a story about the social dimensions of forest dependence, or forest-dependent places. Subsequent work of a similar nature brought the point home very strongly. Den Otter and Beckley (2002) replicated the methods employed in the Foothills work in the Western Newfoundland Model Forest and found that, despite relatively poor performance on the standard suite of quantitative indicators, people's subjective assessments suggested that quality of life was quite high.

The SIMFOR Web Site

The Web site known as SIMFOR (Socio-economic Indicators for the Model Forest) is one of the more high profile products of this early work in identifying relevant indicators of community sustainability. Sponsored by Canada's Model Forest Program, SIMFOR is accessible through their local-level indicators website (http://www.modelforest.net/e/home_/locallee.html) and provides a large amount of Census-based information specific to model forest communities. Given the variation in size and human population among model forests, each region was invited to identify four communities for which SIMFOR would report in detail. The site provides a user-friendly geographic information system (GIS)-based tool to access information specific to the socio-economic conditions of model forest communities. SIMFOR contains three functional areas.

Thematic mapping allows users to combine (overlay) biophysical features with socio-econonic features (with zoom-in functionality). Base layer maps include rivers, roads, national parks, model forests, and cities. Thematic maps include: forest reliance indexes for 1991 and 1996, an economic diversity index for 1996, and a breakdown of forest reliance into pulp, logging, lumber, and forest service sub-sectors. Fig. 2 illustrates the forest-reliance index for 1996. Any combination of base layers can be added to a map along with a single thematic map layer. Also, users are able to zoom in on any specific region of the country.

Compare locations allows users to compare socio-economic data for different regions of the country. Data include rates of unemployment, real estate values, income, education attainment, poverty, migration rates and forest reliance for 1991 and 1996. Comparisons are possible both within individual model forests as well as between model forests.

Community profiles allows users to download Adobe Acrobat PDF-formatted files of socio-economic data for all model forest regions. These files contain extensive data on indicators related to the sustainability of human communities within the model forest boundary. Both charts and tabular formats are available (see Fig. 3).

The advantage of this type of product is the uniform nature of data provided by the Census of Canada that is updated on a five-year basis. It affords the opportunity to compare information across communities and regions. Geomatics formats such as SIMFOR are also very familiar to a forestry audience and can serve as a flexible and expandable platform for both national-level as well and local-level reporting on human activity and community well-being in forest ecosystems. The downside to this approach, however, is the static nature of information provided. In other words, we are looking at particular snapshots in time, rather than the process and mechanisms that brought a community to this point. Also, the indicators selected for SIMFOR are very much expert-driven with no regard for regional or community-specific priorities or unique sustainability concerns. In the following sections, we will examine efforts to define local-level indicators as well as efforts to identify more process-based indicators of community sustainability.

Democratizing the Process

Shortly after the development of national-level indicators of sustainable forest management (CCFM 1997), Canada's Model Forest Program became interested in developing local-level indicators as a priority initiative during Phase II activities (1997–2002). This initiative came from a realization that "the ability to demonstrate national advancements towards sustainable forest management rests largely with actions that are carried out at the local level. If these local actions are to be assessed it will require indicators that are particularly suited to local needs" (von Mirbach 2000). Due to this program emphasis, all 11 model forests put in considerable effort to develop indicators of sustainable forest management suitable for monitoring and evaluation at a regional level. Some model forests struck local-level indicator committees and other model forests hired staff or consultants to coordinate and deliver a broad suite of local indicators that would reflect the values and priorities of the individual partner organizations.

At a model forest Criteria and Indicators workshop in Prince George, BC, Beckley suggested a triad approach for community sustainability indicators. The idea was to have some common indicators across all model forests (as those provided by SIMFOR), some indicators related to similar themes, but measured through different means (thus creating an experiment framework for indicator monitoring), and some indicators selected to reflect the totally unique character of a given model forest or a given model forest's management approach (see Bas St. Laurent experience below). In many respects, our own research efforts on community sustainability indicators attempt such a triad approach. Individual efforts of other model forests

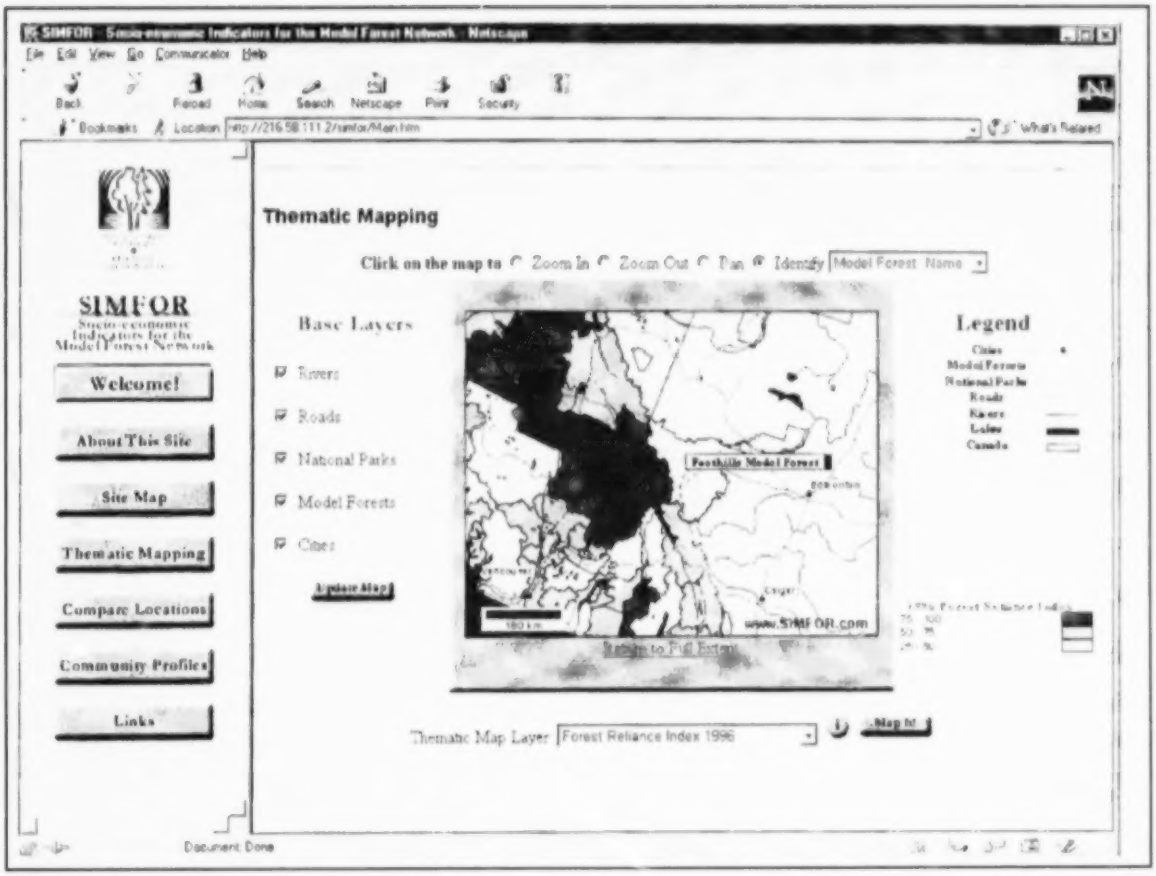

Fig. 2. SIMFOR screen grab showing forest reliance index for 1996.

have also contributed to diverse methods and approaches to assessing community sustainability.

To describe the diversity of local-level approaches, we provide examples from several model forests. With the exception of the Waswanipi Cree Model Forest, all model forests started with the six criteria for sustainable forest management as defined by the Canadian Council of Forest Ministers (CCFM). From this organizing framework, the identification of local-level indicators varied quite dramatically. Specific to indicators of community sustainability, which are encompassed within CCFM Criterion 6 (accepting society's responsibility for sustainable development), Lake Abitibi Model Forest and Foothills Model Forest chose to adopt a suite of indicators in line with those proposed by Parkins and Beckley (2001) and made available nationally with Census of Canada data in the SIMFOR project (discussed earlier). These indicators include average income levels, poverty rates, education attainment, migration rates, employment conditions, and real estate values. Using Census of Canada data was appropriate in both of these locales because of the presence of several large forest-based communities within or adjacent to their model forest land base. Instead of developing community-level indicators, Bas-Saint-Laurent Model Forest took a very different approach by developing indicators relevant to two forest management strategies: forest tenant farms (Farm) and group ventures (Group). The indicators chosen (Table 1) relate more directly to the social and economic benefits associated with these forest management arrangements.

During this time of local-level indicators development, Parkins, Varghese and Stedman (2001) initiated an experiment with different methods for developing local-level indicators that went beyond the committee-based or partner-based approaches outlined above. This research for the Prince Albert Model Forest (PAMF) represents an effort to ascertain meaningful and locally appropriate indicators of community sustainability (Parkins, Varghese and Stedman 2001; see also Parkins, Stedman and Varghese 2001). This task was challenging because of the diversity of communities within the PAMF jurisdiction. Waskesiu is a seasonal resort town located in the Prince Albert National Park. Candle Lake is a year-round resort village of 500 with a predominant population of senior citizens, and Montreal Lake is a Cree Nation reserve. Given the broad range of interests represented by these communities, the challenge for this project was two-fold: to identify indicators consistent with community goals while at the same time aligning those same indicators with a broad suite of sustainability concerns. Linking to sustainability concerns is crucial here. Without identifying indicators relevant to some fundamental sustainability concerns, a local-level approach falls short. It fails to move indicator research out of the realm of community development and into the

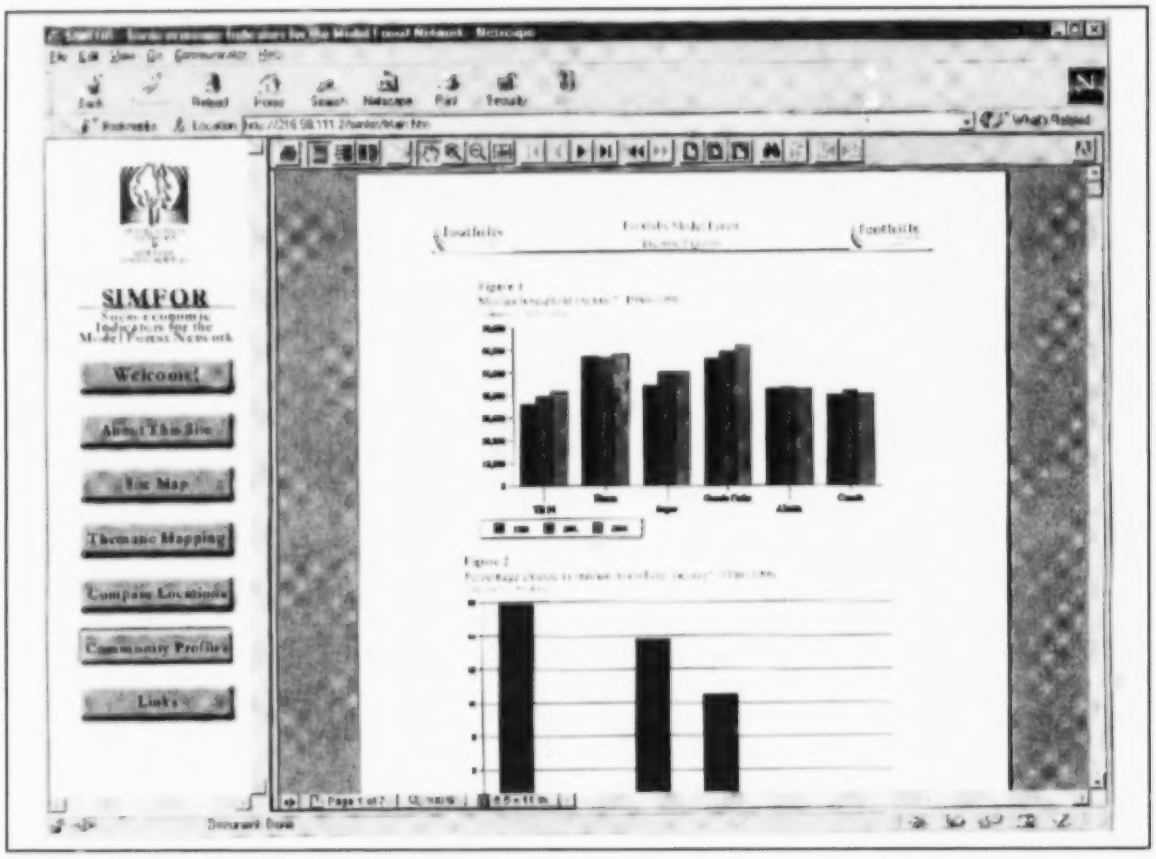

Fig. 3. SIMFOR screen grab showing detailed income profile.

realm of sustainability research. In order to evaluate the utility of specific local-level indicators as indicators of community sustainability, they employed an evaluation framework developed by Hart (2000). According to these criteria, good sustainability indicators are:

- Understandable and useable by the community
- Take a long-term view of progress
- Address economic, social or biological diversity
- Address intra- and inter-generational equity
- Show linkages between social, economic and environmental factors
- Monitor use of natural resources
- Address the state of ecological services
- Address beauty and life-affirming qualities of nature
- Address social, built, and financial capital
- Do not come at the expense of other communities

Very briefly, research methods involved the following. Indicators were identified for each community through workshops with local residents. After identifying local-level indicators, those with relatively high scores on the evaluation framework were included on a short questionnaire administered to community members. This exercise served as a test of the appropriateness of indicators developed within the workshops and as an opportunity to prioritize the indicator list (see Parkins, Varghese and Stedman 2001 for a more detailed methodology). The end result of this process was a list of indicators, priority rankings, and sustainability rankings for each indicator in each community (see Table 2 as an example). Since this work was completed in 2000, the PAMF has funded ongoing research to refine indicators for PAMF communities and to develop baseline data (Hawkins-Stovel and Varghese 2002).

The advantage of this type of "bottom-up" approach to local-level indicators development is the increased relevance of indicators to community goals and aspirations. The findings emphasize the need for caution in asserting the utility of *one-size-fits-all* approaches to community sustainability. A given community may define progress toward sustainability quite differently from other communities or from so-called "experts," and therefore require a unique set of progress measures. Increased local relevance may also translate into long-term interest and a desire on the part of local communities and agencies to become involved in research and long-term monitoring. Such efforts may also serve to focus attention on local issues raised by these measurement activities. The disadvantages associated with this general approach are obviously the loss of opportunity to compare indicator benchmarks or trends from one community to the next. Many of the local-level indicators, as in the Bas-Saint-Laurent case, require local data collection that can be costly and time consuming. Furthermore, local goals and priorities are likely to shift over time, resulting in a constant need for revised indicator and tracking protocols. Although perhaps

Table 1. Bas-Saint-Laurent social and economic indicators

Indicator	Management Strategy	Interval	Source
Population age structure	Group	5-year	Statistics Canada
Average income of tree farmers	Group	5-year	Statistics Canada
Permanent and seasonal jobs in the forestry sector relative to totals jobs	Group	5-year	Statistics Canada
Average earnings of tree farms	Farm	Annual	Internal Management Documents
Tree farm hiring	Farm	Annual	Internal Management Documents

Source: von Mirbach 2000.

Table 2. Locally defined indicators for Montreal Lake, SK

Indicator	Survey Priority[1]	Measure	Effectiveness Ranking[2]	Sustainability Ranking[3]
Physical, mental, and spiritual health of residents	Very High	(multiple): physical=e.g., # children born underweight, blood pressure) mental: health centre mental well being cases	High	Medium
Availability of appropriate housing	Very High	Waiting time for subsidized housing	High	Medium
Access to basic services	Very High	Availability of education programs, health centres, food	High	Medium
Access to traditional knowledge	Very High	Number of traditional ceremonies	High	Medium
Stable home life	Very High	Proportion of homes where community services intervene	High	Low
Opportunities to retain language	Very High	Number of residents speaking Cree	High	Low
Subsistence lifestyle	High	% of meat needs met through subsistence	Medium	High
Access to nature	High	Perceived connection to nature—daily life	Medium	Medium
Economic well-being	High	Prevalence of low income residents	Medium	Medium
Community cohesion	High	% (type) feeling they can rely on others	Medium	Medium
Opportunity in resource sector	Medium	% of employable population employed in natural resource sectors	High	High
Openness/access to off reserve members	Medium	Perception of connectedness to reserve by different social groupings	Medium	Medium
Availability of affordable transport	Medium	Cost and frequency of bus service to Prince Albert	Medium	Medium
Security: protection from outside forces	Medium	Number of childhood interventions from outside the community	Medium	Medium

[1]Survey priority is determined by mean scores and points assigned to each survey statement.
[2]Effectiveness ranking indicates factors such as availability, reliability and meaningfulness of long-term data tracking.
[3]Sustainability ranking assesses the effectiveness of the measure at addressing key issues of community sustainability.

unworkable on a larger scale, the bottom-up approach to indicators development provides a useful anecdote to much of the expert-driven indicators work currently underway.

Process Indicators

There is an important distinction to be made between profile indicators and what we call process indicators. Profile indicators are useful for illustrating *how things are*, but not all that useful for discovering *how things came to be that way* or *what needs to happen for things to be different.* Profile indicators, such as those described earlier (the standard quantitative suite included in SIMFOR and in Parkins and Beckley 2001, and den Otter and Beckley 2002), and even those defined with local input (as in Parkins, Varghese and Stedman 2001) tend to be static and descriptive. They involve variables that describe a situation at a given point in time. Process indictors examine social processes, relationships between groups or individuals, people's perceptions of their own well-being, and individual and collective behaviour based on these perceptions. They also look at factors that may contribute to the profile indicators looking the way they do. That is, they deal with more causal variables, rather than outcome variables. More specifically, process indicators (1) embrace variation within and between communities, rather than seeking uniform, standardized

approaches; (2) some process indicators are more radically subjective in that they entail community-based assessments not only of priorities for sustainability but also community-based evaluations about whether sustainability is being achieved; (3) as their name implies, process indicators focus on the dynamic, process-based nature of communities—their adaptability in the face of external challenges; what residents *do* rather than who or how they *are*.

Measures of process indicators include such variables as leadership (both quantity and quality), volunteerism, entrepreneurship, and sense of place. The combination of process and profile indicators is increasingly used to create indexes or aggregate pictures of rural communities that focus on community capacity, community well-being, and community resilience (Nadeau *et al.* 1999). These constructs reveal important insights into the sustainability of rural communities. They allow us to better explain the social dynamics that may lead to a situation where a rural community has high levels of education and income, but where social cohesion is low and as a result residents may be relatively ineffective when collective action is required. Or conversely, they may help us understand communities with high rates of unemployment and poverty, but where community cohesion and attachment is high and people are loath to leave.

First, we consider process indicators more closely and how they contribute to the desired outcomes of capacity, well-being or resilience. For the most part these are things that have not been measured in any Canadian forestry-related indicator programs or processes, but they are things that sociologists and other social scientists look at as important contributors to community sustainability. It is important to note that process indicators are often equated with qualitative modes of inquiry—i.e., unlike quantitative Statistics Canada data, these more subjective variables are assumed to be primarily phenomena best addressed via qualitative methodologies such as interviews and case study research. Though qualitative methodologies are useful to be sure, many of these constructs are readily assessed through quantitative inquiry (Stedman 2002), allowing comparisons to be made between communities, or within a community, between different segments of the population (e.g., males versus females), or over time. We have begun to examine, in model forest research, a number of these indicators and have started to link them to more conventional profile indicators. However, more work of this nature needs to be done.

Leadership has two important dimensions that can essentially be boiled down to quantity and quality. Quality of leadership has to do with effectiveness, but effectiveness may be manifest in several forms. It could be the ability to inspire people within a given community to work, or to give, or to build coalitions to accomplish goals. Effective leadership may also be measured by the ability to draw in resources from outside the community in order to achieve local goals. The depth of the leadership base refers to renewal and the size of the pool of leaders from which a community may draw. As such, it relates to nurturing young leaders, providing space and opportunity for them so that a wide pool of available leaders is created and maintained. This does not refer only to political leadership, but leadership in the business sector or the social sector as well. Leaders who view other leaders as competitors take a narrow and short-term view. Leaders who view other leaders as resources and potential partners serve their communities better in the long run. The quality and quantity of leadership and mapping local decision-making structures is a traditional line of enquiry in sociology that could prove useful in future model forest research.

Volunteerism is another important process indicator. People who are willing to work toward common goals without direct compensation improve the quality of life for their communities. Communities vary greatly in their ability to mobilize an active voluntary sector. And while it seems a qualitative phenomenon, volunteerism can be quantified easily in terms of numbers of social service organizations, membership in those social service organizations, level of activity of those organizations, and the like. As with leadership, this indicator has a depth and a breadth component. A community may have many voluntary groups, but few volunteers. Many rural places are characterized by a small minority who volunteer for everything, and a large majority that do little for the common good. Measuring both aspects of volunteerism is important to get a true picture of the voluntary sector of any given place.

Social networks, or social capital as it is increasingly called, is another critical process indicator. While this is a more subjective construct than profile indicators, there are still ways to quantify the phenomenon. Researchers who study social networks and social capital focus on the number and strength of ties, the nature of mutual obligation inherent in those ties, as well as their geographical distribution.

The links between *entrepreneurship* and community sustainability are fairly direct and obvious. Do local people have the skills, experience, and the self-motivation to create new jobs and opportunities for themselves if their old jobs disappear? This, of course, is related to other factors as well, such as the support local residents or the local government gives to small and local businesses. Do community residents shop locally, or do they travel to larger, regional centres to shop from larger retail outlets. Do governments support business development and offer incentives for business start ups, or do they create barriers to entrepreneurial efforts? These issues factor heavily in to community sustainability.

Sense of Place may be a crucial indicator of community sustainability (Stedman 1999), and is perhaps the most subjective of the process-oriented indicators of sustainability. Unlike constructs such as resilience, capacity, or cohesion, sense of place can only be measured from the point of view of community members themselves. Sense of place has been defined as the meanings and attachments held for a spatial setting by an individual or group (Tuan 1977, Brandenburg and Carrol 1995). Stedman (2002) breaks sense of place into three different components: satisfaction (one's attitude towards the condition of the setting); attachment (the importance of the setting to one's sense of self); and meanings (descriptive beliefs about the essence of a setting that form the basis of evaluations such as satisfaction or attachment). Each of these elements pertains to community sustainability: is satisfaction with various community elements maintained, and are important meanings preserved that may serve as the locus for self-identification? All of these are measurable via quantitative measures and may be entered into models predicting individual and collective behaviours related to community sustainability.

The Sustainable Forest Management Network and Foothills Model Forest are currently funding research that examines sense of place in three diverse forested settings in Canada. Researchers (Beckley and Stedman 2000) hope to better understand what factors connect people to where they live, and the relative impor-

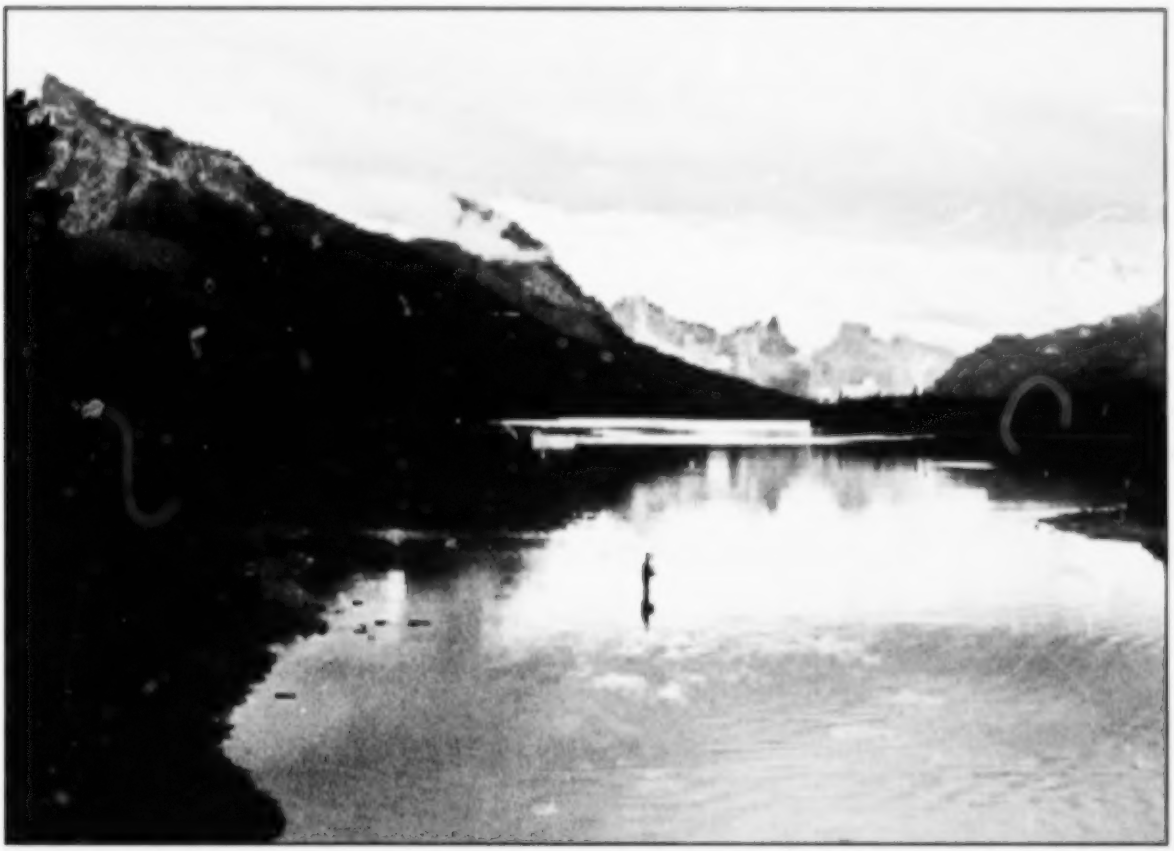

Fig. 4. Sense of place as represented by photo image in Jasper National Park, Alberta.

tance of factors such as landscape characteristics, friendships, and family ties. Research thus far has been conducted in the Foothills Model Forest of Alberta, and the Western Newfoundland Model Forest and has involved local resident photographs (and follow-up interviews) of local landscape or community aspects that held strong personal meaning. Early results suggest a number of differences in the relative roles of landscape and community characteristics: for example, people living in and around Jasper National Park (Foothills Model Forest) emphasized park-based recreation and scenery (Fig. 4), while Newfoundland participants were less likely to emphasize the park or the natural landscape more generally, focusing instead on social relationships, and local institutions such as their churches (Fig. 5).

Social scientists have described community sustainability through several constructs, among them community capacity, community well-being, and community resilience; the first and last of these explicitly reference some adaptive component. While these vary somewhat, efforts to measure these constructs involve combinations of process and profile indicators, and they involve quantitative and qualitative assessment tools. We describe each in brief detail below, for a more thorough review of these concepts see Nadeau *et al.* (1999) or refer to the original broad-scale ecosystem assessment work that led to the merger of these concepts with the subject of resource-dependent communities (Kusel 1996, Quigley *et al.* 1996, Harris *et al.* 1998).

Community capacity is the collective ability of residents in a community to respond to stresses (both externally applied and internal to the community); to create and take advantage of opportunities; and to meet the needs of a diverse set of residents (Kusel 1996). Determinants of community capacity include social capital (the will and ability of people to mobilize resources and work together), human capital (the education, job experience, acquired skills, health and mobility of individuals), and infrastructure that supports the economic and social activities of the community, and natural resources or natural capital as the goods and services delivered by the natural world that affect community well-being. Forces outside the immediate community, such as macro institutional decision-making, or environmental change, affect each of these.

In Canada, Nadeau (2001) adopted the community capacity framework in her study of Haut-St-Maurice, a forest industry region in Quebec. Based on interview data, she identified the factors that contribute to and detract from community capacity over time. For example, early capacity was based on plentiful natural resources, including forests, water and agricultural land. Mill founders exerted a dominant influence on community organization. However, change of mill ownership over time led to a steady decline in the direct involvement of mill owners in community life, leaving a void for local leaders to emerge. In recent years, industry downsizing has highlighted factors that contribute to weak local capacity such as

Fig. 5. Sense of place as represented by photo image in Rocky Harbour, Newfoundland.

a lack of investment in human capital, poor entrepreneurial skills and limited public participation in local resource management. However, as the community continues to evolve, capacity improves as niches left by industrial and religious leaders are filled by other community interests.

Community resilience is somewhat similar to capacity as it emphasizes people's ability to take charge of local institutions to work towards a positive outcome for the community. The Interior Columbia Basin Ecosystem Management Project (ICBEMP) defines community resilience as: the capacity of humans to change their behaviour, redefine economic relationships, and alter social institutions so that economic viability is maintained and social stresses are minimized" (Quigley *et al.* 1996). Here, community resilience was measured at two different scales, the county level and the community level. At the county level, the team developed a socio-economic resiliency index (based on existing data) that integrates measures of economic resiliency, population density and lifestyle diversity. The community-level index was built from primary data such as residents' perceptions of aesthetic attractiveness, proximity to outdoor amenities, level of civic involvement, effectiveness of community leaders, economic diversity and social cohesion among residents over time (Harris *et al.* 1998).

Community cohesion. Communities are collectivities of individuals, and can be defined by the bounds of social interaction (Wilkinson 1991). The degree to which the interactional community functions smoothly is another crucial process indicator of community sustainability. Many of the profile indicators such as education, employment, or income implicitly or explicitly assess the level of "human capital" held by community residents. To a certain degree, these human skills are bound up as well in process indicators such as community capacity and resilience. However, cohesive communities are characterized by high rates of social capital, or the degree to which community residents are tied together by networks of reciprocity and exchange. Regardless of the human capital of the participants, these relations increase community sustainability as well (Putnam 2000). In summary, process indicators such as those described here, are often neglected yet critical indicators of community sustainability. It is tempting for community researchers to move straight to profile indicators that are readily obtainable from secondary data sets and provide unambiguous statements of quality of life in rural communities. Unambiguous results comes at a cost, however: much of the real story of what makes a community tick is lacking from these profile indicators, particularly when the local community has lacked input in their selection. To maximize validity (and utility) of research, process indicators at minimum can provide a "validity check" on one-size-fits all profile indicators and provide measurable, important, applicable results in their own right.

Conclusion: Measuring the Things That Really Matter

One common problem that continues to plague the forestry community's search for social indicators is that many still feel compelled to focus on forest-related indicators that have a social dimension or the word "community" associated with them. Stated slightly differently, people tend to begin with the forest and look for the social angle (see CCFM 1997, indicators as an example). This approach, in fact, confuses ends and means. What really matters, and therefore what we need to measure, is the degree to which our communities are healthy and sustainable, and whether they provide a high quality of life, and a nurturing environment in which to live and grow. We need to start with communities and think about how forests contribute, as a means to sustaining them. Forests contribute in many ways, but too often, we have difficulty seeing beyond the jobs and income they provide through the extraction and transformation of primary and secondary wood products. It is entirely possible that a community could decouple from its traditional timber-dependent base, but retain its forest as a critical factor in its sustainability.

Sustainability is about adaptive capacity, in both human and biological systems. For communities, sustainability hinges on the ability to deal with change, to reconfigure available resources, and to recombine financial capital, local skills, and natural resources in ways that create sustainable livelihoods. Forests can and do play supportive roles in this. We traditionally think of that role as creating jobs and wealth through primary production and secondary production. However, forests may also contribute to community sustainability by providing

high amenity values. People may be attracted to a place because of the quality of the local environment or for aesthetic dimensions of the local landscape. Whether that attraction means people come to live there, or they come to visit is immaterial. Both may contribute to community sustainability. Property rights and tenure may contribute to community sustainability. The opportunity to own forest land may increase attachment to it. If attachment to place is higher for communities where private ownership is prevalent, this may lead to more sustainable communities. Many of these relationships need further exploration and testing. The point is that forests sustain communities in many ways, but our current accounting frameworks narrowly focus on the few related to timber extraction and processing.

Regardless of the particular way that forests sustain us, most believe and we agree that sustainable forests are critical to sustainable communities. This is not a new idea. Kaufman and Kaufman (1946) said basically the same thing over a half-century ago. However, we must measure the sustainability of communities by using community well-being indicators, not forest-related indicators. After all, well-being may increase as forest-dependence decreases. As communities diversify away from timber extraction and production and attract new industries, they may stabilize their economic base, provide better employment opportunities for women, bridge the income gap that characterizes many forest-dependent places and decrease rates of in- and out-migration. On the other hand, as communities lose employment in forestry work, they may begin a downward spiral from which they do not recover. The key is how they combine their resources and adapt to the change agent, whether it be internal (declining human capital) or external (consolidation and rationalization of pulp and sawmill processing). As forests represent a key component in the natural asset base for thousands of Canadian communities, they are a huge contributing factor to community sustainability. Sustainably managed forests enhance the asset base upon which a given community may draw from to create positive outcomes. A healthy, productive, well-managed forest increases the chances for positive outcomes, while a degraded, depleted, poorly managed forest decreases those chances. This is true from the woodlot to the landscape level. However, sustainable communities rely on other factors besides forests to produce the desired outcomes of well-being, capacity and resilience.

Increasingly, social scientists are using indexes of various sorts to measure the desirable attributes of capacity, well-being and resilience. Previous research has often shown an association between forest-dependence and low capacity, low resilience, and poor performance with respect to overall well-being (high incomes notwithstanding) (Kusel and Fortmann 1991, Peluso *et al.* 1994). High population turnover, unstable real estate values due to booms and busts, low attachment to place, bimodal incomes distributions, and high poverty rates have characterized many forest-dependent communities in the past. Our collective examinations of profile indicators, and qualitative work in forest communities have born out some of these trends (Parkins and Beckley 2001, den Otter and Beckley 2002). Our intent with this paper is to suggest that we need to push social indicator work in forest communities more toward sociological traditions that look at the complex interactions between social and natural environments. Profile indicators are useful for illustrating *how things are*, but less useful for explaining *how things came to be that way*. In order to move profile indicators in the desired direction toward sustainability, we need a better understanding (and thus further research) of *what needs to happen for things to be different*. This will require a deeper understanding of social processes, how economic, social and ecological factors combine in complex systems to produce different outcomes. Process indicators will play a critical role in increasing our understanding of the complex interactions.

References

Beckley, T.M. 1995. Community stability and the relationship between economic and social well-being in forest-dependent communities. Society and Natural Resources. 8(3): 261–266.

Beckley, T.M. and T.M. Burkosky. 1999. Social indicator approaches to assessing and monitoring forest community sustainability. Northern Forestry Centre Information Report NOR-X-360. Natural Resources Canada, Edmonton, AB.

Beckley, T.M. and R.C. Stedman. 2000. Understanding Forest Users' Sense of Place: Implications for Forest Management. Accepted Proposal to the Sustainable Forest Management Network. University of Alberta, Edmonton, AB.

Brandenburg, A.M. and M.S. Carroll. 1995. Your place or mine? The effect of place creation on environmental values and landscape meanings. Society and Natural Resources 8: 381–398.

Canadian Council of Forest Ministers (CCFM). 1997. Criteria and indicators of sustainable forest management in Canada. Technical Report. Natural Resources Canada, Ottawa, ON.

den Otter, M.A. and T.M. Beckley. 2002. "This is paradise": Monitoring community sustainability in the Western Newfoundland Model Forest using subjective and objective approaches. Atlantic Forestry Centre Information Report M-X-215. Natural Resources Canada, Fredericton, NB.

Force, J.E. and G.E. Machlis. 1997. The human ecosystem. Part II: Social indicators in ecosystem management. Society and Natural Resources 10.

Harris, C.C., W.J. McLaughlin and G. Brown. 1998. Rural Communities in the Interior Columbia Basin: How Resilient are They? Journal of Forestry 96(3): 11–15.

Hart, M: 2000. Hart Environmental Data. [On-line] http://www.sustainablemeasures.com/ North Andover, MA.

Hawkins-Stovel, J. and J. Varghese. 2002. State of Local-Level Community Sustainability for two Communities within the Prince Albert Model Forest. Prince Albert, SK: A report submitted to PAMF Ecosystem Health/Local Levels Indicator Working Group. Prince Albert Model Forest, Prince Albert, AB.

Himelfarb, A. 1982. The Social Characteristics of One-Industry Towns in Canada. *In* R.T. Bowles (ed.). Little Communities and Big Industries. Butterworths, Toronto, ON.

Kaufman, H.F. and L.C. Kaufman. 1946. Toward the stabilization and enrichment of a forest community. The Montana Study. University of Montana. U.S. Forest Service, Region One. Missoula, MT.

Kusel, J. 1996. Well-being in Forest-Dependent Communities, Part I: A New Approach. Sierra Nevada Ecosystem Project: Final Report to Congress. No. 39. Wildland Resources Center Report. University of California, Davis.

Kusel, J. and L.P. Fortmann. 1991. Well-being in Forest Dependent Communities. v.1. California Department of Forestry and Fire Protection.

Lucas, R. A. 1971. Minetown, Milltown, Railtown: Life in Canadian Communities of Single Industry. University of Toronto Press, Toronto, ON.

Marchak, M.P. 1983. Green Gold: The forest industry in British Columbia. University of British Columbia Press, Vancouver, BC.

Nadeau, S. 2001. Characterization of Community Capacity in a Forest-Dependent Community: the Case of the Haut Ste-Maurice. Unpublished Manuscript. Department of Forest Resources, Oregon State University.

Nadeau, S., B. Shindler and C. Kakoyannis. 1999. Forest Communities: New Frameworks for Assessing Sustainability. The Forestry Chronicle 75(5): 747–754.

Parkins, J.R. and T.M. Beckley. 2001. Monitoring community sustainability in the Foothills Model Forest: A social indicators approach. Atlantic Forestry Centre Information Report M-X-211E. Natural Resources Canada, Fredericton, NB.

Parkins, J.R., R.C. Stedman and J. Varghese. 2001. Moving towards local-level indicators of sustainability in forest-based communities: A mixed-method approach. Social Indicators Research 56: 43–72.

Parkins, J.R., J. Varghese and R.C. Stedman. 2001. Locally defined indicators of community sustainability in the Prince Albert Model Forest. 2001. Northern Forestry Centre Information Report NOR-X-379. Natural Resources Canada, Edmonton, AB.

Peluso, N.L., C.R. Humphrey and L.P. Fortmann. 1994. The rock, the beach and the tidal pool: people and poverty in natural resource-dependent areas. Society and Natural Resources 7: 23–38.

Putnam, R. D. 2000. Bowling along: the collapse and revival of American community. Touchstone, New York, NY.

Quigley, T.M., R.W Haynes and R.T. Graham. 1996. Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins. USDA Forest Service PNW-GTR-382. Portland, OR.

Stedman, R.C. 1999. Sense of Place as an Indicator of Community Sustainability. The Forestry Chronicle 75(5): 765-770.

Stedman, R.C. 2002. Toward a Social Psychology of Place: Predicting Behavior from Place-Based Cognitions, Attitude, and Identity. Environment and Behavior (in press).

Tuan, Y. F. 1977. Space and place: The perspective of experience. University of Minnesota Press, Minneapolis, MN.

Wilkinson, K.P. 1991. The Community in Rural America. Greenwood Press, Westport, CT.

Von Mirbach, M. 2000. A users' guide to local level indicators of sustainable forest management: Experiences from the Model Forest Network. Natural Resources Canada, Ottawa, ON.